**Small Business Innovation Research/Small Business Tech Transfer**

# FARADAYIC(R) Electrochemical Peroxide Generation for In-Situ Disinfection, Phase II

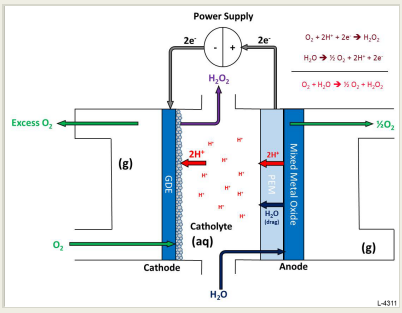
Completed Technology Project (2017 - 2022)

## Project Introduction

Among the numerous technological advances sought in order to facilitate human space travel, solutions are needed for technology that supports energy-efficient maintenance of closed air, water, and waste systems in microgravity spacecraft habitats, like Mars. In particular, a technique for the in-situ generation of cleaning/sanitizing solutions is needed to reduce the demand of earth based materials like cleaning supplies to meet personal hygiene requirement during space missions. Therefore, In this Phase II SBIR program, Faraday will continue the technology development efforts of the Phase I by: (1) demonstrating the potential of the device design by testing under zero gravity; (2) optimizing the GDE catalytics, structure, and wettability, (3) demonstrating the potential to use onboard ISS water utilities, (4) developing an electrochemical peroxide detector, and (5) designing and building an α-scale reactor to produce 1 L/day of 2 w/w% H2O2. This evaluation will enable TRL enhancement and demonstrate a potential path forward for demonstration. This technology has the potential to be an alternative method for synthesis of commercial hydrogen peroxide or in-situ onsite disinfection of process waste streams and could be an integral part of long term life support on NASA's manned space missions.

## Anticipated Benefits

At present, surface disinfection in NASA space vehicles is accomplished through the use of pre-packaged, disposable, wetted wipes, which represent an appreciable carry-along mass and disposal burden. The proposed hydrogen peroxide generation system offers a more economical and practical alternative that can use onboard utilities of water and oxygen to produce a disinfectant solution that can be applied to reusable cloths, reducing both the carried and disposed mass associated with the disinfection process. The anticipated benefits of this program will be the implementation of high efficiency in-situ FARADAYIC Peroxide Generation technology that will eliminate the need for disinfecting wipes to be intermittently flow to the International Space Station, thus reducing cost and improving efficiency.The proposed innovation has the potential to be useful in a variety of situations where disinfection of process streams or contact surfaces is of importance. The system would be valuable in a broad range of other settings as well, including disinfection of recycled waste water streams. Some potential installation/sales targets include naval warships and military field hospitals, as well as chemical or biological waste treatment laboratory environments where on-site generation of hydrogen peroxide for experimental or cleanup use may be of value. The primary markets for peroxide use are in the paper-and-pulp and chemicals industries (~36% each), with the balance in wastewater treatment, mining, and other minor areas. Thus, in addition to in situ generation applications, the technology could also be valuable as an alternative method for synthesis of commercial hydrogen peroxide.




FARADAYIC(R) Electrochemical Peroxide Generation for In-Situ Disinfection, Phase II Briefing Chart Image

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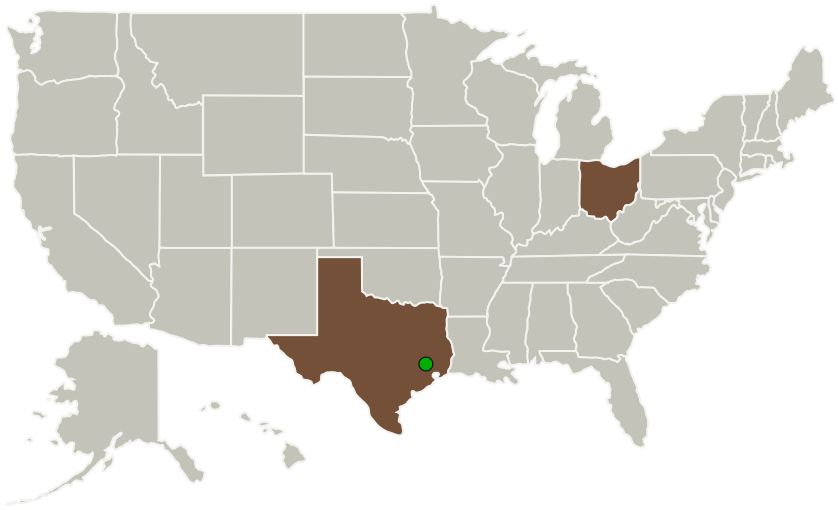
## Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Faraday Technology, Inc | Lead Organization | Industry | Clayton, Ohio |
| Johnson Space Center(JSC) | Supporting Organization | NASA Center | Houston, Texas |

| Primary U.S. Work Locations | |
|---|---|
| Ohio | Texas |

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Faraday Technology, Inc

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Project Managers:**

Jeffrey J Sweterlitsch
Kathryn B Packard

**Principal Investigator:**

Santosh Vijapur

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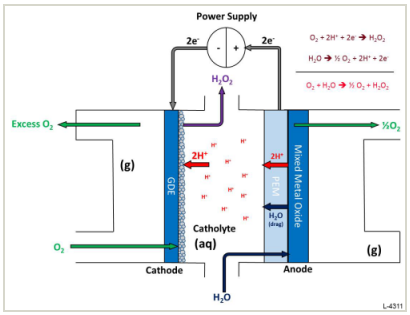
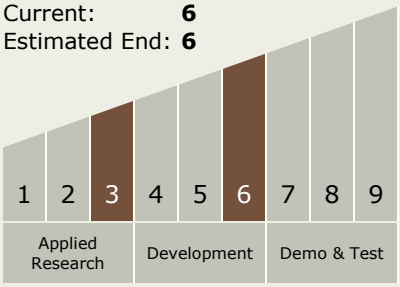
## Images




**Briefing Chart Image**
FARADAYIC(R) Electrochemical Peroxide Generation for In-Situ Disinfection, Phase II Briefing Chart Image
*(https://techport.nasa.gov/image/129890)*

## Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**




## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System